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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/582,936	06/15/2006	Toshiyuki Maeda	2257.0260PUS1	9823

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EXAMINER	
BEHM, HARRY RAYMOND	

ART UNIT	PAPER NUMBER
2838	

NOTIFICATION DATE	DELIVERY MODE
07/17/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary	Application No.	Applicant(s)	
	10/582,936	MAEDA ET AL.	
	Examiner	Art Unit	
	HARRY BEHM	2838	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 June 0506*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 June 2006* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/15/06, 8/10/06, 8/20/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

The information disclosure statements (IDS) submitted on 6/15/06, 8/10/06 and 8/20/07 have been considered by the examiner.

Response to Amendment

A preliminary amendment was received 6/15/06.

Drawings

Figures 12 and 13 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, setting turn-on losses

(Esw(on) = Esw/2), as in Claim 8 or 10, must be shown or the feature canceled from the claims. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-10 and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimakage (US 6,550,290) in view of Makino (JP 04-359890), Mitsubishi Application Note "Using Intelligent Power Modules" and further in view of Toshiba Application Guideline 15.

With respect to Claim 1, Shimakage discloses a current supply circuit (Fig. 5) comprising a voltage doubler rectifying circuit (Fig. 5 29) connected to an AC supply (Fig. 5 34) and a polyphase inverter (Fig. 5 37) including series switching elements (Fig. 5 38a,b) and outputting an AC current from each node (Fig. 5 40a).

Shimakage does not disclose the voltage of the AC source. Makino teaches doubling a 200V power supply (Fig. 1 14). It would have been obvious to one of ordinary skill in the art at the time of the invention to use a 200 V power supply. The reason for doing so is it is well known that a 200V power supply is a standard voltage provided in Japan.

Shimakage does not disclose the breakdown voltage of the switching elements. The Mitsubishi Application Note teaches use of a 1200V module with the advantages of "higher reliablility, lower cost and reduced EMI". It would have been obvious to one of ordinary skill in the art at the time of the invention to use 1200V transistor. There are many known reasons for using a 1200 voltage transistor in a 400 volt application. It is well known to oversize the transistor to provide overvoltage protection. It is also well known that heating occurs as current squared, therefore for the same amount of power provided, by doubling the voltage the required current is halved and the current squared

losses are reduced. It is also known to oversize transistors to extend the life and reliability of the product;

"In order to understand the significance of utilizing more expensive, 1700V rated IGBTs in 600V drives used in heavy duty, industrial applications, some basics need to be outlined.
First of all, the DC bus voltage is approximately equal to 2 x RMS AC input voltage. If the input voltage for example is 600V, the DC bus voltage becomes 848V. If the input voltage rises to 10% above nominal, i.e. 660V the DC bus voltage becomes 933V. If there are any transients on the line, the input voltage increases accordingly. When the drive slows the load down, the motor acts like a generator and transfers energy back to the drive further increasing the DC bus voltage. If a conventional 1200V PIV rated IGBT is used in a drive, it is apparent that the DC bus voltage can rapidly approach the PIV rating of the device.
Secondly, to make matters even more complex, reflected waves caused by the fast rise times of the IGBT interacting with the motor impedance and cable characteristics can cause additional over voltage stresses on the IGBTs …
Finally, if the DC bus trip voltage is set too close to the PIV rating of the IGBTs, they will be subjected to undue stress, which can easily lead to premature failure…
Transistors which are "oversized" can handle significantly more transient current before tripping and have additional thermal capability to prevent damage due to the transient I^2t heating during a fault condition. In short, larger output transistors translate into improved ability for a drive to accommodate overload stresses without damage or partial damage. This is a key feature of an industrial duty drive. Increased output transistor sizing provides increased reliable overload capability" (Toshiba Application Guideline #15, pages 1-2).

With respect to Claim 2, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" and Toshiba Application Guideline #15 disclose the current supply circuit as set forth above wherein said switching element (Fig. 5 38a-38f) is an IGBT.

With respect to Claim 3, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" and Toshiba Application Guideline #15 disclose the current supply circuit as set forth above wherein the inverter module is modularized as set forth above. It would have been obvious to one of ordinary skill in the art at the

time of the invention to modularize the rectifier. The reason for doing so is to reduce the size and cost.

With respect to Claim 4, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" and Toshiba Application Guideline #15 disclose the current supply circuit as set forth above wherein a polyphase motor (Shimakage Fig. 5 17). Shimakage does not disclose the rating for the motor. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a 400V motor. The reason for doing so is the voltage bus (Fig. 5 44) is operated at 400V.

With respect to Claim 5, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" and Toshiba Application Guideline #15 disclose a method of designing a current supply, wherein the effective value voltage is the input voltage of 200 volts, and the switching element (Fig. 5 38a-38f) breakdown voltage of 1200 volts is twice a first breakdown voltage of 600 volts, obtained by performing full wave rectification (Fig. 5 30) of the AC input voltage. See claim 1 for additional details.

With respect to Claim 6, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" and Toshiba Application Guideline #15 disclose a method as set forth above wherein said AC input voltage (Fig. 5 34) is a single phase and said voltage doubler rectifier (Fig. 5 29) outputs a rectified voltage to said polyphase inverter (Fig. 5 37).

With respect to Claim 7, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" and Toshiba Application Guideline #15 disclose a method as set forth above wherein the switching element is selected in a range of low turn-on losses since the switching elements are switched on or off quickly.

With respect to Claim 8, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" and Toshiba Application Guideline #15 disclose a method as set forth above. It would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the turn on losses and breakdown voltage. Optimization of losses or breakdown voltage through routine experimentation is typically not patentable. See MPEP 2144.05 II. OPTIMIZATION OF RANGES

A. Optimization Within Prior Art Conditions or Through Routine Experimentation

Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be prima facie obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid

concentration of 10%.); see also Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382 ("The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."); In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969) (Claimed elastomeric polyurethanes which fell within the broad scope of the references were held to be unpatentable thereover because, among other reasons, there was no evidence of the criticality of the claimed ranges of molecular weight or molar proportions.). For more recent cases applying this principle, see Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990); and In re Geisler, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997).

With respect to Claims 9-10, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" and Toshiba Application Guideline #15 disclose a method as set forth above. See claims 7 and 8, respectively, for additional details.

With respect to Claim 13, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" and Toshiba Application Guideline #15 disclose a method as set forth above, and do not disclose the switching frequency. Mitsubishi Application Note "Using Intelligent Power Modules" teaches how to determine the control circuit current for a 1200 volt module when operating at 7kHz, "For example, to determine the maximum control circuit current for a PM300DSA120 operating at 7kHz"

(page 17). It would have been obvious to one of ordinary skill in the art at the time of the invention to operate at 7kHz switching frequency. The reason for doing so is it is well known to operate high power electronics at 7kHz or less.

With respect to Claim 14, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" and Toshiba Application Guideline #15 disclose a method as set forth above, wherein the predetermined effective voltage is 200 V and the first breakdown voltage is 600 V.

With respect to Claim 15, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" and Toshiba Application Guideline #15 disclose a method as set forth above, wherein the switching element is an IGBT.

Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimakage (US 6,550,290) in view of Makino (JP 04-359890), Mitsubishi Application Note "Using Intelligent Power Modules",Toshiba Application Guideline #15 and further in view of Mitsubishi Application Note "General Considerations for IGBT and Intelligent Power Modules".

With respect to Claim 11, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" and Toshiba Application Guideline #15 disclose a method as set forth above, and do not disclose how to predict the switching loss.

Mitsubushi Application Note "General Considerations for IGBT and Intelligent Power Modules" teaches how to determine the switching loss in IGBT Loss equation 1, which is a product of three terms , the IGBT saturation voltage drop (Vce(SAT)), the peak value of sinusoidal output current (Icp), and the time integral of the cycle. It would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the switching losses. Optimization of losses through routine experimentation is typically not patentable. See MPEP 2144.05 II. OPTIMIZATION OF RANGES

A. Optimization Within Prior Art Conditions or Through Routine Experimentation

Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be prima facie obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.); see also Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382 ("The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."); In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969) (Claimed elastomeric polyurethanes which fell within the broad scope

of the references were held to be unpatentable thereover because, among other reasons, there was no evidence of the criticality of the claimed ranges of molecular weight or molar proportions.). For more recent cases applying this principle, see Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990); and In re Geisler, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997).

With respect to Claim 12, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" ,Toshiba Application Guideline #15 and Mitsubishi Application Note "General Considerations for IGBT and Intelligent Power Modules" disclose a method as set forth above. See claim 11 for additional details.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HARRY BEHM whose telephone number is (571)272-8929. The examiner can normally be reached on 7:00 am - 3:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Akm E. Ullah can be reached on (571) 272-2361. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Harry Behm/
Examiner, Art Unit 2838

/Jeffrey L. Sterrett/
Primary Examiner, Art Unit 2838